concave below. The stigma is located medially on the roof of the spur entrance where pollen would contact it as an upright moth inserts or withdraws its proboscis.

Spur length and orientation were important characters determining insect pollinators of Japanese *Platanthera* spp. (Inoue loc. cit.). *Platanthera* species with short spurs (1–2 mm long) were pollinated by beetles; those with 4–6 mm long horizontal spurs were pollinated by small pyralid moths; those with 10–20 mm long decurved spurs were pollinated by medium-sized noctuid and geometrid moths; and those with >20 mm long spurs, by sphingid moths. In *Platanthera dilatata* var. *dilatata*, the spur is about 10 mm long and decurved; it is pollinated by medium-sized noctuids, which agrees with the observations on Japanese *Platanthera* spp.

A number of moth species may pollinate *Platanthera dilatata* var. *dilatata*. Studies in Sweden showed that one *Platanthera* species was pollinated by 28 moth species, of which 80% were medium-sized noctuids (Nilsson, Bot Notiser 131:35–51, 1978). In Japan, most *Platanthera* spp. were pollinated by at least 2 to 3 insect species (Inoue loc. cit.). This note is the first record of *Discestra oregonica* moths pollinating *P. dilatata* var. *dilatata*. Most likely nocturnal observations or collections of moths near this orchid would provide additional pollinators.

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MICRODISSECTING EQUIPMENT FOR BOTANICAL WORK.—Martin F. Ray, Department of Integrative Biology, University of California, Berkeley, CA 94720.

Securing a botanical specimen is generally a major difficulty when an investigator is dissecting and manipulating small plant material. The delicacy of some plant structures makes them very susceptible to damage by crude instruments or poor cutting techniques. For holding, fingers are relatively large and awkward and can easily ruin fine structures. Holding with the fingers also leaves only one hand free. Double-sided tape has been used, but the specimen is not easily reoriented. Fine forceps are an improvement, yet they also leave only one hand free to operate other instruments. In cutting, a scalpel or a razor blade is usually satisfactory for larger, tougher structures or specimens, but the tendency of a single blade, no matter how sharp or fine, is to put pressure on the tissue being cut. This often results in tearing the specimen or other inability to selectively control the dissection. Since one generally is interested in observing fine details, methods of holding the specimen and manipulating or cutting its delicate parts without undesirable damage are advantageous. This paper describes techniques and equipment for holding and cutting botanical specimens which are useful in fine manipulation under the dissecting microscope. These techniques and equipment are based on those developed primarily for use with insects, and in some medical work.

Specimen holding. For holding the specimen, petri dishes of various sizes filled with a material that allows for pin placement have been used for insect dissection. The smallest type of insect pins, known as "minuten" pins, are very suitable for work with fine plant structures. For example, I have been able to dissect and observe the interior of male florets from *Soliva sessilis* R.&P. (Asteraceae), which are about 2 mm long, using these techniques. Another example is preparation of a dissection of a flower for photography. Even a larger flower can be laid out nicely using minuten pins. Although various types of wax are often used for pin emplacement, the best material I have seen is a form of liquid silicone that is heat cured, marketed as Sylgard 184 Resin by Dow Corning. This material can be left clear or colored with various materials, the most common being pure powdered carbon to render the Sylgard black. The carbon is mixed into the resin prior to pouring into petri dishes and heat curing. If the Sylgard is left clear, it is far superior to wax for transmitted illumination. The Sylgard is quite long lasting, although after years of use it may need to be replaced because of loss of clarity or resiliency. A Sylgard-filled petri dish combined with stainless steel minuten pins (thinnest grade) allows the use of both hands for instrument manipulation, photography, etc. If the dish is small or light it can be held down with double-sided tape. The minuten pins are handled entirely by means of forceps; they are too small to be placed with bare hands. These pins are approximately 0.1 mm in diameter and 5–10 mm long. They can be cut down to any desired length by means of fine wire cutters.

Pins must be stored by placement in the Sylgard. Because of their minute size they are more dangerous, in terms of possible puncture wounds, than larger pins or needles. They are also very hazardous if dropped or misplaced; a minuten pin caught in an article of clothing could cause a very painful injury.

Dissection. Iris scissors are used in entomological dissections and also in some medical work. They are also useful for fine plant work. Different sizes of iris scissors are available from surgical supply houses. Although various types of scissors are called "iris scissors," the type of interest have blades approximately 3–10 mm long, or less, and are sold under the names Weiss, Martin, Vannas, Castroviejo, and others. They are also referred to as "microdissecting scissors." These are operated by squeezing the spring-like handles with two fingers. They are quite expensive, but the control they allow is worth every penny. The ability to selectively snip rather than tear makes it possible to perform the very finest detail work. The only limiting factor becomes manual dexterity. Using the holding techniques described above, one can use a fine forceps in one hand and the iris scissors in the other, or use two pairs of forceps.

All these fine instruments respond to very light pressure. Make sure that there is sufficient support for the hands, as movement is mostly via the fingers. Often the best way to achieve this is with a microscope with no stage, working instead directly on the bench, where the hands can rest. If transmitted illumination is desired, one might set up a large piece of clear glass or plexiglass as a bench top.

It is useful to have a couple of pairs of iris scissors, one larger and one finer. Other types of fine surgical scissors of larger size are also useful for larger structures or in cases where the specimen material is hard enough to damage iris scissors. The larger surgical scissors are less expensive and more easily sharpened if damaged. I have not yet tried any operations on plant material that seemed hard enough to be harmful to my instruments, but this may be the case with some members of the Poaceae, Cyperaceae, Juncaceae, and *Equisetum,* and some woody materials.

Instrument repair and modification. If fine instruments such as forceps or iris scissors are damaged at the tips, they may be repaired by careful work under the stereoscope. Any bending can be slowly and gently correlated by light pressure on a bench surface or by the use of forceps of an appropriate (usually larger) size, this second pair acting as a pair of pliers. Tips can be repaired, sharpened, or customized using a fine oilstone and a small amount of light oil. Carefully rub the tips, one at a time, over the oilstone in oil, back and forth in a filing motion, working under the dissecting microscope. The oilstone removes material from the instrument tip as a fine file. Renew the oil occasionally. Iris scissors, or probes with dull points, may be sharpened or have their tips modified for custom purposes in the same way. When doing this, take care to maintain the original blade angle. I have one pair of iris scissors which had sustained damage on one blade only, and I created a new instrument by filing down and sharpening the damaged blade so that it was shorter than the other. This unequal blade length scissor allows one to lift up and probe or slide under a delicate object prior to cutting. There are many other possibilities for custom instruments.

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